

Claims

1. An automatic system (10) for taking of a fluid sample from a sample site (SS) of a living test object, comprising:
 - 5 - catheter means (C_A, C_B) comprising a three-way junction (C_J) configured to be located in proximity to said sample site (SS), said three-way junction (C_J) is connected to a first catheter means (C_A), a second catheter means (C_B) and a sample-taking end (C_{TE});
 - a valve (V_{A2}) connected to said first catheter means (C_A), said valve (V_{A2}) having an inlet (V_I) for an immiscible fluid to be aspirated into said first catheter means (C_A); and
 - 10 - pumping means (P_A, P_B) connectable to said catheter means (C_A, C_B) and configured to aspirate an amount of said immiscible fluid (AB) into said first catheter means (C_A) and to move said amount of said immiscible fluid (AB) to said three-way junction (C_J) and arrange a first part (AB₁) of said immiscible fluid (AB) in a part of said second catheter means (C_B) and a second part (AB₂) of said immiscible fluid in a part of said first catheter
 - 15 means (C_A); whereby said first (AB₁) and second (AB₂) parts of said immiscible fluid (AB) being configured to separate a taken sample (TS) from the rinsing fluid.
2. The system as recited in claim 1, wherein said pumping means (P_A, P_B) further being configured to control the flow rate and the flow direction of a fluid comprised in said
- 20 catheter means (C_A, C_B) such that said fluid flow can pass by said sample-taking end (C_{TE}) when flowing from one of the first and second catheter means (C_A, C_B) to the other.
3. The system as recited in claim 1 or 2, wherein said sample-taking end (C_{TE}) is configured to be placed at said sample site (SS), wherein said pumping means (P_A, P_B)
- 25 being configured to move said first part (AB₁) of said immiscible fluid (AB) towards an end opening of said sample-taking end (C_{TE}) and to take a fluid sample when said first part (AB₁) is located at the end opening, and wherein said pumping means (P_A, P_B) is configured to transport said taken sample (TS) from said sample-taking end (C_{TE}) to a sample-delivery end (C_{DE}) configured to deliver said taken sample (TS) to a sample tube
- 30 (T).
4. The system as recited in any of the preceding claims, further comprising a plurality of valves (V_{A1}, V_{A2}, V_{B1}, V_{B2}, V_{B3}, V_{B4}) arranged at said catheter means (C_A, C_B) and

configured to control the flow path of said fluid in said catheter means (C_A , C_B).

5. The system as recited in claim 4, further comprising a control unit (CU) connectable to said pumping means (P_A , P_B) and said plurality of valves (V_{A1} , V_{A2} , V_{B1} , V_{B2} , V_{B3} , V_{B4}) and configured to control the operation of said pumping means (P_A , P_B) and said plurality of valves (V_{A1} , V_{A2} , V_{B1} , V_{B2} , V_{B3} , V_{B4}).

6. The system as recited in any of the preceding claims, wherein said catheter means (C_A , C_B) comprises a double lumen catheter means..

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7. The system as recited in any of the preceding claims, further comprising a source of a rinsing fluid (F_A , F_B) connectable to said catheter means (C_A , C_B) and configured to supply a rinsing fluid from said source (F_A , F_B) to said catheter means (C_A , C_B);

- 15 8. The system as recited in claim 7, wherein said pumping means (P_A , P_B) are configured to provide a flow of rinsing fluid from said source (F_A , F_B) of rinsing fluid through said catheter means (C_A , C_B) to a waste tube at the delivery end (C_{DE}) of said catheter means (C_B).

- 20 9. The system as recited in claim 8, wherein the flow of rinsing fluid is accomplished by means of a first pumping means (P_A) providing a pushing action equal to a suction action provided by a second pumping means (P_B), whereby the rinsing fluid will pass by said sample-taking end (CE) without entering it when flowing from said first catheter means (C_A) to said second catheter means (C_B).

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10. The system as recited in claim 8, wherein the flow of rinsing fluid is accomplished by means of a first pumping means (P_A) pushing with a slightly higher pressure than a second pumping means (P_B) is sucking, whereby a part of the rinsing fluid enters and rinses said sample-taking end (C_{TE}) of the catheter means (C_A , C_B).

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11. The system as recited in claim 10, wherein said sample-taking end (C_{TE}) is rinsed by means of said first pumping means (P_A) pushing at 100% of a flow F and said second pumping means (P_B) sucking at 90% of said flow F .

12. The system as recited in any of the preceding claims, wherein said pumping means (P_A , P_B) is configured as one single double-acting suction and force pumping means with a first part (P_A) having the capability of providing a pushing action and a second part (P_B) having the capability of providing a suction action, or vice versa, and wherein said first and
5 second parts (P_A , P_B) further being configured to operate simultaneously or separately.
13. The system as recited in claim 12, further comprising a third pumping means configured to operate when the first and second parts of said double-acting suction and force pumping means (P_A , P_B) are operated separately and to compensate for the action of
10 the active one of said first (P_A) and second parts (P_B).
14. The system as recited in any of the preceding claims, further comprising analysing means (AM) configured to analyse said taken fluid sample (TS).
- 15 15. The system as recited in any of the preceding claims, further comprising a source of a drug solution connectable to said catheter means (C_A , C_B), said pumping means (P_A , P_B) being configured to transport an amount of said drug to said sample-taking end (C_{TE}) and supply said a drug to said sample site (SS).
- 20 16. A method for automatic taking of a fluid sample from a sample site (SS) of a living test object, comprising the steps of:
- supplying a rinsing fluid to a catheter means (C_A , C_B) (step 100);
 - aspirating an amount of an immiscible fluid (AB) into the catheter means (C_A , C_B) (step 102);
 - 25 - moving said amount of said immiscible fluid (AB) to a three-way junction (C_J) of said catheter means (C_A , C_B) (step 104);
 - moving a first part (AB_1) of said immiscible fluid (AB) towards an opening of a sample-taking end (C_{TE}) (step 106);
 - withdrawing a fluid sample (TS) (step 108);
 - 30 - arranging a second part (AB_2) of said immiscible fluid (AB) after said taken sample (TS) (step 110);
 - moving said taken sample (TS) in said catheter means (C_A , C_B) to a sample-delivery end (C_{DE}) at a sample tube (T) (step 112);
 - delivering said taken sample (TS) to said sample tube (T) (step 114); and

- rinsing the lumens of said catheter means (C_A, C_B) by providing a flow of rinsing fluid through said catheter means (C_A, C_B) (step 116).

17. A computer program product for use in an automatic system for taking of a fluid
5 sample from a sample site (SS) of a living test object said computer program product comprising computer code portions configured to realise means and functions of any of the preceding claims.
18. A set of disposables for use in an automatic system for taking of a fluid sample from a
10 sample site (SS) of a living test object according to any of the claims 1 – 15.